

PATENT SPECIFICATION

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(4) IMPROVEMENTS IN OR RELATING TO CONTROL OF FLUID FLOW

(71) W. CRINOSPITAL SPA, an Italian company, of Via Cerna, Pescara, Italy, for which we proxy that a copy may be granted to us, and the methods by which it is to be performed, to be particularly described in and by the following drawings:

This invention relates to a device for controlling the flow of fluid through a flexible tube. The invention is particularly but not exclusively useful in medical and pharmaceutical applications, such as transdermal infusions, perfusions, hyperthermotherapy, and the laboratory or chemical applications, where a precise metering of liquid flow at low pressure is required.

The device already known for infusions or transfusions generally comprises a needle to be driven through the skin, a cannula being fitted to the needle, a clamp being applied to the tube, which is connected to a syringe, and a stopcock which is connected to the tube. The tube is connected to a second flexible tube extending thereto and which can fit the injection needle. To the latter flexible tube, in order to control the direction of the flow of liquid, a clamp is fitted for controlling the tubular liquid flows. Such clamps, or similar means, presently in use do not give good control of the flows, which is why it is desired to obtain a new period of time during which the clamp is closed. In fact such clamps or similar means, when in the operative position, press tightly the flexible tube walls so that the tube with respect to the clamp is compressed in very tight, which leads to buckling of the tube, which lead to buckle the tube wall in a transverse direction. When the clamp is then wholly or partially released, the tube is again compressed, with the result that the original setting tends to change since the substantially resilient material of the tube with respect to the clamp tends to return to its new operating position, which is however subject to high stress. The effective cross-sectional area of the tube may therefore show slight variations over a period,

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portion to cause the arm to move in a direction towards the body, which thereby causes the body portion to expand the walls of a flexible tube passing through the body, thus controlling the flow of fluid through the tube.

The hollow body may be formed from two substantially equal sized members fixed together with spacers through opposite walls of the members through which the tube passes.

Advantageously there is mounted on the hollow body a suitable retainer means capable in use of retaining the control member in a defined operative position.

The device may further include a suitable metal or a rigid plastic material.

It is evident that the invention may be clearly understood as an embodiment thereof.

20 It may be described by way of example with reference to the accompanying driving in which:

Figure 1 is a diagrammatic longitudinal cross-section through a control device for fluid flow through a flexible tube, the device being in an inactive position;

Figure 2 is another diagrammatic longitudinal cross-section showing the device of Figure 1 in an operative position;

Figure 3 is a schematic longitudinal cross-section showing a device for controlling the flow of a fluid through a flexible tube comprising a pair of members 1 and 3 fitted together to form a hollow cylindrical body. Mounted in the members 1 is a slider 4 which is operatively connected to a guide rail 5 (not shown) fixed in member 1.

The extreme portions of the slider are as indicated in Figures 1 and 2 respectively. An

operatively connected member 6 is disposed in a slot 7 formed in the slider 4, and a hook portion 8. The arm portion 3 is substantially straight and the hook portion 7 is of a shape such as to be capable in use of being inserted into the tube 9 to define a tube 9 through the device so as to allow fluid to flow therethrough. The flexible tube 9 can be connected to a rigid tube 10. A push rod 11 and a pivot point 14 can be used to apply pressure to the hook portion 8 to cause the lever 3 to become operative.

The tube 9 is formed from a resilient material, preferably a segmented rubber.

The tube 9 has a generally circular cross-section, although it is possible of elliptical cross-section, so that deformation can more easily occur in the direction of the major axis of the ellipse.

To use the device as described above, the arm portion 3 is depressed by pressure applied via the push rod 11. The push rod 11 reciprocates in a direction as indicated by arrow 12. The arm portion 3 is normally normally operated for small, controlled forces, such as for normal infusions.

However the push rod may be controlled by an

extensible spring when the device works with time and has to be continuously actuated.

According to the present invention, the control lever can attain any intermediate position between the two extreme positions defined in Figures 1 and 2. Once the device reaches its extreme position, it is possible to keep lever 3 in position by means of a lockable device, such as a lockable lever 13. Figure 4 shows the slider 4 in its non-operational position with the lever held in its non-operative position by the flexible tube 9.

The device according to the invention may form an integral part of a drive assembly, such as a hypodermic assembly, which is supplied prepared and ready for service under the control of an infusion or transfusion actuator. Such an assembly is shown in Figure 5, and once set is then disposed of after use.

WHAT WE CLAIM IS—

1. A device for controlling the flow of a fluid through a flexible tube comprising a longitudinally extending hollow body with longitudinally opposed spacer walls for accommodating the tube and body defining a transverse wall for controlling the flow of fluid through the tube, whereby the said tube carrying means comprises a lever having a transverse wall and a hooked portion with respect to said transverse wall, the hooked portion being located on the far side of the transverse wall, the section of the hooked portion of the lever nearest to the transverse wall being curved to accommodate the tube in the transverse direction, with the section of the hooked portion of the lever nearest to the transverse wall comprising the tube in the transverse direction.

2. A second embodiment of the invention, the device comprises a hollow body having a pair of apertures through which a flexible tube can enter and leave the body, the body being formed with a transverse wall, the section of the transverse wall being curved to accommodate the tube in the transverse direction, with the section of the transverse wall comprising the tube in the transverse direction.

3. A third embodiment of the invention, the device comprises a hollow body having a pair of apertures through which a flexible tube can enter and leave the body, the body being formed with a transverse wall, the section of the transverse wall being curved to accommodate the tube in the transverse direction.

4. A device as claimed in Claim 1, and further including an extensible spring slidably mounted on the lever for holding the lever in a fixed position.

5. A device for controlling the flow of a fluid through a flexible tube, substantially as hereinbefore described, the device being as and as shown in, the accompanying drawings.

6. A flexible tube having fitted thereto a device as claimed in any preceding claim.

7. An infusion or transfusion apparatus comprising a flexible tube as claimed in claim 4.

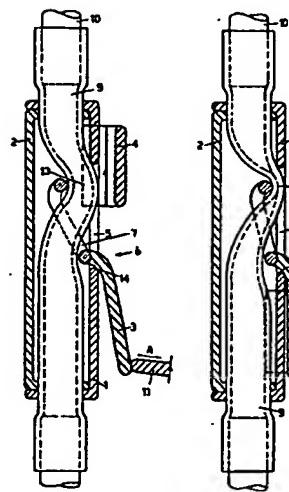


Fig.1

Fig.2

1 403 828 COMPLETE SPECIFICATION
 1 SHEET This drawing is a representation of
 the Original as a reduced scale